ERP AND E-BUSINESS

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Abstract: The Internet has revolutionized twenty-first century business. Organizations today can communicate with customers, suppliers, and sellers at e-speed with the click of a mouse. Yet, with all of the excitement about the external possibilities of the Internet, companies still need efficient internal processes to make and move products, manage finances, recruit and motivate employees, and excel. The companies best positioned to succeed in the near future are those that can balance existing enterprise resource planning (ERP)-based infrastructures and capabilities with exciting new e-business innovations. This paper elaborates the issues of ERP and e-business.

Keywords: ERP, E-Business, network, enterprise, management.

Introduction

Enterprise Resource Planning systems (ERPs) integrate (or attempt to integrate) all data and processes of an organization into a unified system. A typical ERP system will use multiple components of computer software and hardware to achieve the integration. A key ingredient of most ERP systems is the use of a unified database to store data for the various system modules. The term ERP originally implied systems designed to plan the utilization of enterprise-wide resources. Although the acronym ERP originated in the manufacturing environment, today's use of the term ERP systems has much broader scope. ERP systems typically attempt to cover all basic functions of an organization, regardless of the organization's business or charter. Business, non-profit organizations, non governmental organizations, governments, and other large entities utilize ERP systems.

Additionally, it may be noted that to be considered an ERP system, a software package generally would only need to provide functionality in a single package that would normally be covered by two or more systems. Technically, a software package that provides both Payroll and Accounting functions (such as QuickBooks) would be considered an ERP software package.

However, the term is typically reserved for larger, more broadly based applications. The introduction of an ERP system to replace two or more independent applications eliminates the need for external interfaces previously required between systems, and provides additional benefits that range from standardization and lower maintenance (one system instead of two or more) to easier and/or greater reporting capabilities (as all data is typically kept in one database).

Examples of modules in an ERP which formerly would have been stand-alone applications include: Manufacturing, Supply Chain, Financials, CRM, Human Resources, and Warehouse Management.

Electronic Business, or "e-business", may be defined broadly as any business process that relies on an automated information system. Today, this is mostly done with Web-based technologies.

Electronic business methods enable companies to link their internal and external data processing systems more efficiently and flexibly, to work more closely with suppliers and partners, and to better satisfy the needs and expectations of their customers.

In practice, e-business usually includes e-commerce. E-commerce seeks to add revenue streams using the Worldwide Web or the Internet to build and enhance relationships with clients and partners and to improve efficiency using the Empty Vessel strategy. Often, e-commerce involves the application of knowledge management systems.

E-business is more than just e-commerce. It involves business processes spanning the entire value chain: electronic purchasing and supply chain management, processing orders electronically, handling customer service, and cooperating with business partners. Special technical standards for e-business facilitate the exchange of data between companies. E-business software solutions allow the integration of intra and inter firm business processes. E-business can be conducted using the Web, the Internet, intranets, extranets, or some combination of these.

Companies have invested billions of dollars collectively in enterprise resource planning (ERP) systems with the objective of attaining an important business promise, complete enterprise integration. For companies faced with incompatible information systems and inconsistent operating practices, ERP has been a dream come true. ERP presents companies with the opportunity to standardize and automate business processes throughout the organizations, thus increasing productivity and reducing cycle time. Although ERP systems have delivered value, it is becoming clear that the ERP model, which wraps organizational processes into one end-to-end application, may no longer be sufficient for today's fast-moving, extended enterprises. With the rapid growth of the Internet, the business environment has changed dramatically. The world has become a global marketplace.

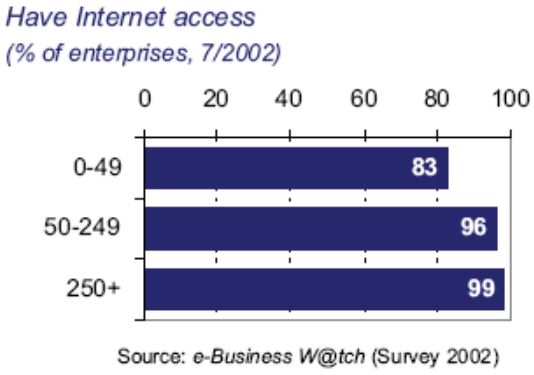

Figure no. 1. Internet access

E-business has changed the definition of enterprise systems. Beyond the core business functions that ERP has traditionally focused on, e-business pushes the ERP from the inside core of the companies to the network edge. Companies are realizing that the most challenging part of e-business initiatives is not in developing a Web storefront but in extending ERP to accomplish business-to-business (B2B) and business-to-consumer (B2C) solutions. A new extended enterprise system emerges by integrating ERP with e-business, which creates business that is more agile, more focused and more competitive than traditionally structured business and tight B2B connections. With the help of the componentization concept, a seamless, end-to-end flow of information and process across the value chain of companies becomes realistic.

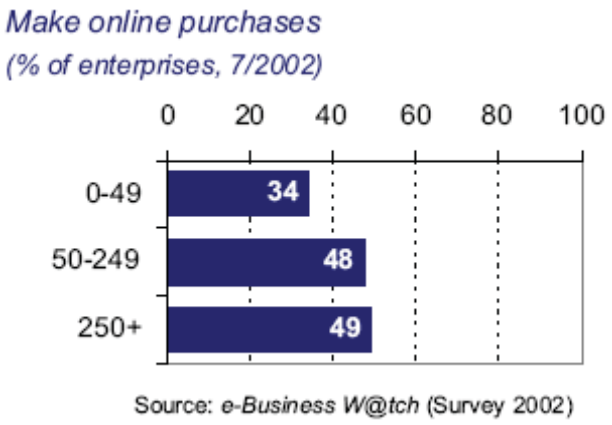

Figure no. 2. Online purchases

ERP and E-Business

ERP is a structured approach to optimizing a company's internal value chain. The software, if implemented fully across an entire enterprise, connects the various components of the enterprise through a logical transmission and sharing of data. When customers and suppliers request information that have been fully integrated throughout the value chain or when executives require integrated strategies and tactics in areas such as manufacturing, inventory, procurement and accounting, ERP systems collect the data for analysis and transform the data into useful information that companies can use to support business decision-making. ERP systems, if implemented successfully, enhance and redesign business processes to eliminate non-value-added activities and allow companies to focus on core and truly value-added activities.

The following are two examples where ERP systems have dramatically increased the efficiency and productivity of companies: IBM has used ERP to reduce the processing time for updating pricing data from 80 days to five minutes and Chevron has used ERP to decrease its annual purchasing cost by 15%. E-business stands for "electronic business," which involves communications and doing business electronically through the Internet. E-business is defined as "the use of electronically enabled communication networks that allow business enterprises to transmit and receive information". It can significantly improve business performance by strengthening the linkages in the value chain between businesses (B2B) and consumers (B2C). Besides increasing efficiency in selling, marketing and purchasing, e-business

achieves effectiveness through improved customer service, reduced costs and streamlined business processes. Furthermore, e-business creates a strategic, customer-focused business environment for shared business improvements, mutual benefits and joint rewards.

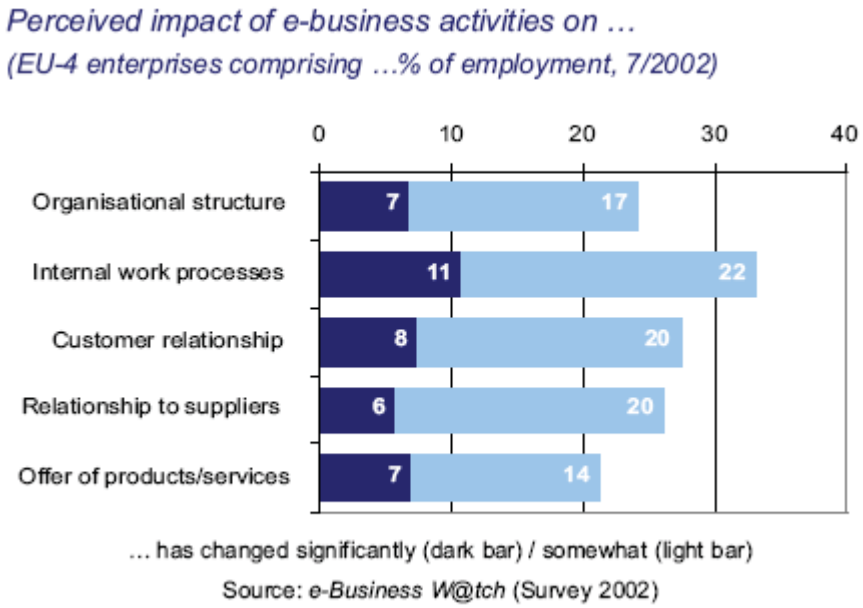

Figure no. 3 Impact of E-Business

Companies use the Internet to implement customer-relation-management (CRM) and supply-chain-management (SCM) capabilities, which enable them to link their operations seamlessly with customers and suppliers. For example: Nantucket Nectars, a juice manufacturer with 40% growth and $70 million in annual sales revenue, sells its organic juices through 150 distributors nationwide as well as general stores and juice bars in Nantucket. By using Oracle's ERP system and e-business platform, the salespersons can track sales and promotions through the Internet, and are provided assistance and suggestions to enhance their performance. The salespersons and distributors have access to commission reports, and they can track and adjust sales orders. Through consolidating its financial, compensation, sales and depletion data into a single report, Nantucket prevents out-of-stock and partial shipments. The forecasted need for 50% more labor force to handle customer service issues in the past was eradicated by integrating ERP system with e-business. By definitions and by their respective functions, traditional ERP systems take care of internal value chain (i.e., within a company) whereas e-business establish the value chain across the market and the industries. More and more companies construct their systems' architectures by integrating ERP systems with e-business. They use Web-based interface (corporate portals) with outside entities plus add-on modules such as CRM, SCM, etc. in the integration.

E-Business pushes ERP to the network edge

In a traditional business process, after a customer order is received, the order information flows from department to department through order entry, manufacturing, warehousing, distribution and finance until the product is delivered to the customer and

the payment is received. The key elements of the value chain have been controlled by separate and disparate information systems that could not communicate with one another. Not only did the companies not take an integrated view of their own business processes, but they also had an equally vague understanding of how their systems relate to the systems of their suppliers, competitors, business partners, distributors and customers. Hence, these transactions are typically carried out with minimal or no shared business processes. In recent years, there has been a revolution in systems planning and design. Management takes an integrated company-wide view of its IT investments and choices, and implements an ERP system that integrates the core business processes of an entire company into single software and hardware system.

Customers, suppliers and business partners are consciously included in the business process, systems operation and systems development. An ERP system is analogous to the internal technological hub of a company. When fully implemented as an integrated suite, it can be thought of as a company's central repository. The five major processes in a typical ERP system are: finance, logistics, manufacturing, human resources and sales/marketing. The focus of ERP systems is on the efficiency and effectiveness of the internal process. It offers a way to streamline and align business processes, increase operational efficiencies and bring order out of chaos. E-business is focused on efficiency and effectiveness of external, cross enterprise processes. While ERP technology supports business strategy, e business opens the door to new strategic opportunities, which forces ERP to take one step further — to move from the single ERP system model to the extended ERP system model. The Web technology provides the bridge between companies and their business partners to make e-business possible, while e-business makes the ERP system more transparent and outward.

Instead of thinking about ERP within a company, we may view the ERP system along the value chain of companies in the same industry, or across industries. Companies are now turning their attention outward to engage in business with customers, suppliers and business partners through the use of the Internet and Web-based technologies. ERP functionality has to move on to the Web because that is where most of the core business processes are being carried out. The earlier example on the flow of a customer order and the steps in the process flow across the boundaries of the companies would now be handled by a number of different companies behaving as if they are one. If a corporation decentralizes autonomous business units, they need to be able to access and share data between departments, managers and employees. With ERP systems, a transaction only needs to be entered once. The system can process the transaction across different software modules, resulting in highly comprehensive and integrated information that can be used for decision-making. While an ERP system can be viewed as a repository for data, information and knowledge, and it extends beyond functional boundaries by redefining enterprise wide processes, a Web-enabled ERP system forces companies to look at processes that span multiple enterprises.

When e-business is integrated with ERP, the whole extended system provides a vision of business processes that span multiple businesses and enterprises. In the most ideal case, companies should be able to connect disparate platforms, applications and data formats across the value chain, including not only suppliers, but also customers as well. Furthermore, companies should retain the flexibility to change and add functions to applications as business needs evolve. Companies need to be able to adapt their ERP systems to the emerging world of e-business.

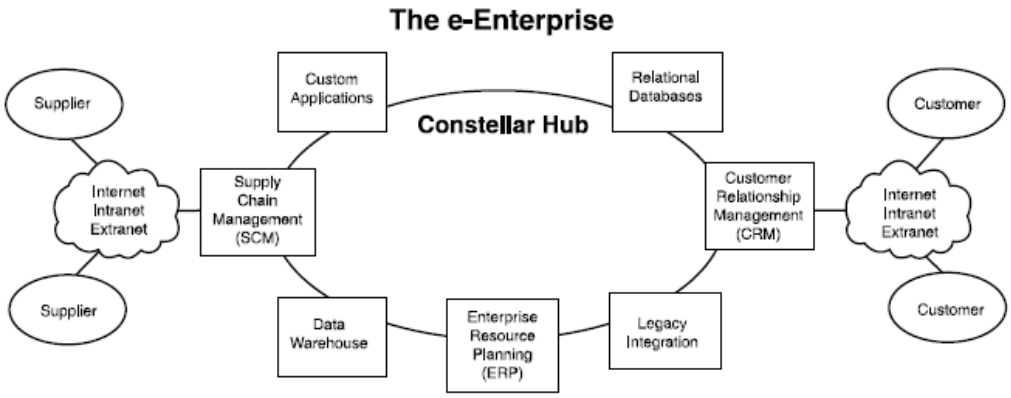

Figure no. 4 The e-Enterprise

A new vision of enterprise = ERP + E-Business

Although ERP integrates core business functions such as logistics, finance, human resources and sales-order administration, there are still many business processes that ERP cannot address. ERP falls short of meeting today's demands from customers for better services. With Web-based technology, information can move swiftly through the value chain, making companies anxious to add functionality to implement specialized applications that can meet their needs. Componentization The Butler Group, a British IT consultancy group, indicates it has seen a backslash against the inadequacies of monolithic application packages and argues that techniques to integrate applications can lead to better solutions without the stranglehold of inflexible functionality. The key question is how to continue adding new functionality rapidly at low cost while making it easier for organizations to implement and upgrade to a platform appropriate for e-business.

The ERP vendors and customers are relatively quick to recognize the benefits of componentization. Before e-business was taken into consideration, most of the ERP systems that have been implemented were delivered as monolithic code and did not employ the componentization concept. Barricaded behind complex, proprietary Application Program Interfaces (APIs) and based on complex, nearly indecipherable relational database schemas, ERP systems do not readily extend to e-business. With the popularity and widespread practice of the object-oriented approach, component-based techniques become essential quality requirements. Componentization is the action of breaking up a large, monolithic ERP system into individual modules that would work together. Components are pieces of code that can be interchanged between applications. This idea is similar to the assembly of automobiles, airplanes and mobile phones. They are combined from parts that work together within an architecture. The parts are not a homogeneous set, but comprise many different types and standards. According to Sprott, a component can be any form of implementation, provided it adheres to the concepts of separation, interfacing and standardization. Most ERP vendors are converting their ERP systems to a component-based architecture.

When ERP is componentized, the internal functions performed by the system are represented using object-oriented blocks of code that can be used to create new

applications. The componentization of functionalities in ERP will make the internal and external systems more adaptable and reliable. Therefore, it will smooth the information flow along the value chain. Based on the object-oriented concept, each functionality of ERP can be viewed as a separate encapsulated entity and treated as a component. By virtue of the independence of components, it is easier to manage, upgrade and modify a component-based ERP system. Granularity, scope boundaries and internal cohesion are important attributes of a component. A fine-grained component will be simple to upgrade because it involves fewer relationships but requires more management since there is likely to be many more parts needed to meet the requirement. In contrast, a larger component may be easier to manage but would require more effort to modify and implement because the scope of the functionality is much broader and the impact of changes is much greater. Since the components encapsulate individual business processes that other components can freely access, companies can more precisely control individual business processes.

This divide-and-conquer approach allows the companies to do rapid concurrent development. Componentization breaks large-scale business processes into self-contained units of manageable size and makes it easier to deploy ERP systems in an e-business environment. ERP and e-business applications can be assembled from Web-based components such as Online Analytical Processing (OLAP) components, batch components, application components and database components. A company implementing an ERP system would be able to select different modules or components from multiple vendors instead of picking a single vendor. Since an ERP system can be broken down into components by functionalities, the vendors would be able to quickly fix or add functionality to ERP systems. An individual component of ERP can be enhanced without affecting any other functional components. IBM research shows that only 20% of companies use a single ERP vendor. Almost 80% of companies use multiple vendors.

Using the Internet-enabled ERP as a foundation, componentization delivers one or more services. The service is the function that the component provides to the user (another server or client). A service might therefore be something very simple such as a look up synonyms service provided by a Thesaurus component, or as comprehensive as update new customer information service provided by a Customer Relationship Management (CRM) application. A series of services provided by multiple disparate components might be integrated into a common workflow that performs a unified business purpose. It is very important that the interface and service provided are independent of the underlying implementation. For example, an implementation of ERP may be provided by a legacy database. With componentization, the legacy database can be replaced by an object-oriented database with no effect on the user of the service, provided the interface remains unchanged. Flexible Customization ERP vendors will come under considerably increasing pressure as they are forced to open up their products and to market components separately before the ERP market becomes saturated.

It is becoming increasingly popular for components to be assembled by customers since companies need flexible ERP systems where new applications can be added fairly quickly and business intelligence can be extracted to fit into B2B and B2C solutions. The successful ERP vendors are beginning to provide customers with flexible and economical operational infrastructure that easily integrate with open market components. These vendors allow customers to exercise considerable choice in

procurement to create customized solutions from readily and widely available building blocks. A major advantage of component-based ERP is the incremental release and upgrade process. This is a benefit in the initial implementation as well as ongoing enhancement. Many ERP vendors and existing customers underwent considerable upgrade pain before they could achieve this result. The realities of upgrading are also not as simple as one might think. A complete integration test should be undertaken because of the high levels of interdependence between the components. The ultimate goal is to develop ERP components that are compatible with one another and that can be easily integrated with e business and other applications.

Current issues

With the rise of e-business, integration becomes a challenging but mission-critical task in the corporate use of information technology. Some companies are reluctant to implement ERP/e-business due to the greater complexity involved in integration. The integration of ERP with other Web enabled applications (CRM, SCM) is a complicated and timing-consuming process. The cost of software, implementation, training and maintenance will increase. The key e-business issue in application integration is to link e-businesses to other applications (that may be based on different technologies, business models and data models) without breaking the value chain. Enterprise Application Integration (EAI) software helps to integrate applications by packaging together the commonly used functionalities—combining popular enterprise packages and legacy applications in a predefined way.

Therefore, EAI will make ERP/e-business integration and componentization simpler and more practical. In addition to the above issues, other issues remain in implementing ERP, integrating the systems and outsourcing ERP/e-business. ERP implementations provide the backbone necessary for e-business. Without successful implementations of ERP, the capabilities provided by Web-based functions are limited. The growing number of horror stories about failure or out-of-control projects should certainly be brought to the companies' attention: FoxMeyer Drug argued that its ERP system drove it to bankruptcy before connecting its system to the Net. Mobile Europe spent hundreds of million of dollars on ERP only to abandon it when its merger partner objected. Dell Computer found that its system would not fit its new and decentralized management model. Despite the promise and the high investment needed in implementing ERP systems and in linking ERP systems to the e-business infrastructure, statistics show that more than 70% of ERP implementations, whether self-created or designed by established ERP software vendors, fail to achieve corporate goals.

The main reasons for ERP implementation failures are due to business and management problems. Companies fail to reconcile the technological imperatives of the ERP with the business requirements of the enterprise itself. If a company rushes to install an ERP without first having a clear understanding of the business implications within an Internet economy, the dream of integration can quickly turn into a nightmare. The logic of the ERP may conflict with the logic of the e-business. Many companies implemented ERP due to its ability to bring order and efficiency through internal standardized business processes. However, every company has its unique business requirements and needs. Standardized processes that fit every organization are very difficult to develop. By implementing ERP, some companies have replaced proprietary processes that were better suited for their needs with standardized ERP processes. Since

ERP business processes are often rigid and the components of the ERP from different vendors are usually not compatible, companies have found adapting ERP to new market demands to be difficult. In SAP R/3, most of the customers inevitably find that at least 20% of their needed functionality is missing from the package. Componentization of ERP functions is in dire need.

Companies need to understand that e-business requires something close to building a second backbone system on top of ERP. They should also realize that it would be neither quick nor easy. IBM estimated that 70% of all codes written today consist of interfaces, protocols and other procedures to establish linkages among various systems. A software analyst at BancBoston, Robertson Stephens, said he spent 50% of his time on enterprise application integrations. The integration requires companies to provide more IT and end-user training. There is a longer learning period requirement for the daily operation. The sheer size, scope and complexity of these projects usually exceed expectations. The result is that companies often wait for years before they begin to see benefits. Lack of functionalities in ERP is forcing business processes to fit the software, and bolting on customized programs, while adding to the time and cost of implementation. Moreover, some alternatives, such as using work-around and customizing the software, increase the difficulty of upgrading to new releases of the ERP package. More often than not, projects wind up late or over budget. In the meantime, business time horizons have grown ever shorter. By the time companies have installed their ERP systems, their business has moved on and their original requirements have changed. Outsourcing implies the use of external agents to perform an organizational activity.

Companies consider outsourcing when:

1) cost saving is expected;
2) management wants to focus on its core business; and/or
3) the internal information systems function is perceived to be inefficient, ineffective or technically incompetent.

Based on case studies, outsourcing decisions may be a result of rational consideration and/or it may be a product of organizational politics, conflicts and compromises. Many companies are outsourcing their ERP/e-business implementation and integration to the best-of-breed vendors to simplify the daily operation and to better control the budget. This enables organizations to focus on their core businesses. Besides, many outsourcers price their services on a monthly basis with a fixed fee. This allows companies to better manage the cash flow and eliminate the large outlays typically associated with software rollouts and upgrades. However, there are challenges in outsourcing ERP/e-business, most of which are strategic and technological issues:

• Renting remotely hosted ERP with e-business functionalities will have impact on the way independent software vendors conduct business. Therefore, it is essential that the vendors provide enough bandwidth and a high level of reliability to ensure that the applications perform at a necessary level for consistent and acceptable service and 24-7 availability.

• Success in ERP calls for extensive customization for power users. (In reality, ERP in midsize and small companies normally does not need much customization.)

• Companies should consider the possible leak of their business logic when outsourcing ERP. Manufacturers that outsource their ERP processes to a third party are launching themselves on a slippery slope to oblivion. For instance, when General Motors outsourced its ERP, it took them years to rebuild that infrastructure. A study of

40 US and European companies concluded that outsourcing led to problems and disappointments.

• Outsourcing ERP/e-business may actually result in higher cost. According to InformationWeek, 19% of respondents said they didn't outsource ERP because they didn't believe it would be a cost-effective solution.

• ERP/e-business outsourcing solution is only dominant in midsize and small companies. According to Mega Group, 60% of small and midsize companies are interested in outsourcing ERP. The large corporations are less likely to outsource their backbone systems.

Future trends

The rapid growth of the Internet will lead to a large increase in the number of ERP users. Companies are eliminating disintegrated legacy systems by replacing them with Web-enabled, integrated ERP systems. These integrated systems become part of the overall business strategy that connects an enterprise with its suppliers and customers, and transforms the entire value chain. Companies that intend to move into a net economy are beginning to emerge and focus on multi-enterprise systems integration and growth. They are forming strategic partnerships with major e-business infrastructure providers (Sun, IBM and Microsoft) to continuously integrate their ERP systems for reaching the internal and external performance target. Major ERP vendors (Oracle, SAP, BAAN, JD Edwards and i2) are constantly updating and releasing integrated ERP/e-business suites to support an open, collaborative and competitive business environment:

• The major ERP vendors will continue to build compatible and adaptable ERP components and develop extended ERP solutions designed to address the latest market demands. For example, Oracle's Release 11i is a business application suite that consists of Supply Chain Management, Order Management and new self-service software modules. It is tied to a Customer Relationship Management (CRM Release 11I and Oracle Exchange) application. The whole software suite works seamlessly with one another to handle everything from customer service on one end to relationship with suppliers on the other. It is all refigured to run on the Web. Based on the company's vision, anyone from giant corporations to tiny dot-coms can buy a single package from Oracle to run their e-business, rather than buying software from a host of competitors and trying to stitch it all together. If it works, it will move computing from desktop PCs to huge Internet servers that run anything from Web sites to complex corporate networks. Oracle's skills and technologies are taking the center stage. JD Edwards offers its One World Software as a host service over networks. This application service is designed to be easier to deploy and adapt. It will overcome the inflexibility of the ERP system on its implementation time.

• With the convergence of the Internet and wireless technology, users can access Web-enabled ERP systems anytime and anywhere through the use of newer and easier-to-use devices, such as personal digital assistants, smart phones, in-devices and biometric tools. For example, an accounting manager who is out of town will leverage his company's ERP with a personal digital assistant to review financial reports and give directions to his subordinates. He/she can log on to the system using his/her fingerprint or voice.

• The use of XML in B2B communications will enable a host of new relationships between companies, vendors, suppliers and customers. Exporting data

from application suites and developer tools using XML will become a standardized feature. For example, IBM translates generic XML information into device-specific formats that can be used on wireless devices.

• Outsourcers, ERP vendors and e-business infrastructure provider's alliance together to provide more robust, scalable and compatible e-business platforms for the companies. PriceWaterhouseCoopers has built a strategic relationship with the Sun-Netscape Alliance (an alliance of Sun and AOL) to provide technology and services that enable companies to build business-critical e-business solutions that leverage investments in SAP R/3. Netscape Application Server for R/3 has provided a reliable infrastructure for Web solution (iPlanet) that allows customers to access PriceWaterhouseCoopers' SAP system in a secure manner.

• The future trend of ERP outsourcing is to explore into the applications service market. By the year 2003, offering ERP service over the Web will be a $2 billion business, as more than a dozen Application Service Providers (ASPs) are moving into the market. ASP's take ERP and non-ERP applications from multiple vendors and put them together into a service. Rather than selling their creations in house to corporate customers, they make their products available over the Web on a lease or rental basis. In addition, some mid-market companies are seeking to outsource their non-core business processes, such as payroll and employee benefit administration. According to a recent survey, 75 to 80% of a company's financial cost is tied up in labor or labor support. Any realistic attempt to reduce or manage costs in the finance and administration area has to focus not only on improved technology, but also on labor issues, the high costs of labor and the shortage of skilled labor.

Conclusion

Given today's information age, e-business is the solution to dictate a successful information economy. However, companies can do little to move into this stage without the underlying (ERP) infrastructure in place as a foundation. Today, extended ERP systems with front-end e-business connect an organization's "front office" (customer facing) and "back office" (business processes) operations to meet its global emerging market. Extending ERP means unleashing critical information and making it accessible to employees, customers and business partners, so that the various entities along the entire value chain can make better decisions. Indeed, best practices consist of real-time, cross-enterprise, Internet based flow of information, documents and processes, that is routed and driven in the most efficient and effective way. From a technical point of view, development and deployment of e-business models never stop. Companies should constantly reinvent to leverage changes in e-business technology and its ERP integration, or other business applications. New e-business models are emerging as companies in all industries are transforming themselves to compete in the Internet economy. Successful transformation requires new e-business strategies and processes, as well as robust and scalable application and technology platforms. With the right strategy and solid execution, an enterprise can transform itself to compete and grow in today's rapidly changing business environment.

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